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# FRUIT AND VEGETABLE PROCESSING IN CHINA*

Prepared by

ZONG Ru Jing**

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* The views expressed by the author in this document do not necessarily reflect those of the UNIDO Secretariat. This document has not been edited.

** Professor, Head, Postharvest Physiology Laboratory, Beijing Vegetable Research Center, Beijing, People's Republic of China.

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## I. SURVEY

1. The processing of fruits and vegetables by drying, pickling, salting and fermenting was initiated hundreds of years ago in China. However, modern techniques of processing by canning, concentration and freezing have been established for several decades. China exported 6,900 tons of canned vegetables in 1957 and 242,446 tons in 1984. Among those exports, that of canned mushrooms increased significantly, and with 110,000 tons was first in the world market in 1984. Factories for freezing fruits and vegetables were built in the mid-1960's. In 1987 production was approximately 20,000 tons, 50% of which was exported and the rest used for the domestic market.

2. In order to meet the demands of both the domestic and export markets, the processing of fruits and vegetables is encouraged by the Government. The processing industry is also considered an efficient way to increase the income of the rural people. The fruit and vegetables processing industry, which is spread out all over China, is administered by four institutions: the Ministry of Light Industry, the Ministry of Commerce, the Ministry of Foreign Economic Relations and Trade and the Ministry of Agriculture. The township industrial enterprises have developed tremendously through the rural economic reform. The total output value of the township enterprises has reached 273.2 billion yuan, which makes up 17% of the national total output value. Fruit and vegetables processing is one of the vital industries in these areas.

3. The total production of fruit in 1986 was 13.5 million tons (m.t.) and includes 3.34 m.t. apples, 2.55 m.t. citrus fruit, 1.25 m.t. bananas and 2.35 m.t. pears, 0.44 m.t. grapes. The total amount of vegetable marketing per year is approximately 1.5 m.t., excluding rural consumption. The above figures indicate great potential for the development of the fruit and vegetables processing industry.

**Canning**

4. There are approximately 600 canning plants which are under control of the Ministry of Light Industry. Total canned products in 1986 amounted to 1.64 m.t. of which 0.76 m.t. was fruit and 0.41 m.t. was vegetables. The amount consisted of 71.6% of the total canning production. Export of canned fruit was 0.05 m.t. and canned vegetables wes 0.28 m.t. totalling 75.3% of canned exports, earning $9.50 billion.

5. Most of the fruit is canned in syrup and the vegetables in spicy water. The production of juices is increasing. Among the canned fruits and vegetables, mushrooms are 0.11 m.t., followed by citrus fruits, pineapples, asparagus, water chestnuts, green beans, peas, bamboo sprouts, tomatoes, broad beans, apples, pears and peaches. The production of canned mushrooms doubled between 1980 and 1985, and asparagus has shown a big potential to increase. Seventy percent of the canning plants are located in provinces along the coast, such as Zhejiang, Fujiang, Guangxi, Shendong and Jiangxi, excluding the Sichuan province. Among them, Guangxi has shown the fastest development in recent years. In the 1950's, canned products were exported mainly to the Union of Soviet Socialist Republics and Eastern European countries and in the 1960's the trend was towards North America, West Europe and Japan. Since 1983 the consumption of canned products by the domestic market has exceeded exports and in 1985 reached 75% of total production.

**Dehydration**

6. The dehydration of Chinese date-jujube, slices of bamboo sprout, yellow day lily and mushrooms are traditional Chinese products. Most of them are exported and rank first on the world market. The exportation of the dehydrated Chinese date is 0.2-0.4 m.t. per year, the black jelly fungi (Auricularia) is 0.25 m.t. per year, which comprised 70% of the world production. The production of oyster cap fungus (Pleurotus ostreatus) is 0.02-0.03 m.t. The production of smoked pasania fungus (Lentinus edodes) is 2,000-2,500 tons, and white jelly fungi (Tremella fuciformis) is 1,500 tons.

There are more than 50 species of mushrooms cultivated in China, the production is 0.25 m.t. each year, which comprises 20% of the world production. The export of the dehydrated products in 1986 was as follows: yellow day lily 2,000 tons, smoked pasanin fungus 1,100 tons, black jelly fungi 1,300 tons and chili 31,000 tons.

**Pickling and salting**

7. Pickling and salting vegetables are also traditional processing methods in China. 0.32 m.t. of pickled and salted vegetables are produced annually by about 1,400 small enterprises. In 1985, production of the famous hot pickled mustard tuber - Tsatsai was 0.2 m.t. with exports of 12,000 tons. In addition, there are traditional candied fruit products of apricots, hawthorns, plums, prunes, apples, pears, tangerines, mangoes, etc. These products are exported mainly to South East Asia.

**Freezing**

8. The process of freezing vegetables for export was initiated in the mid-1960's and has steadily increased; in 1987 about 100 plants produced 20,000 tons. Half of the products were exported and the other half consumed on the domestic market. Products frozen are mainly peas, green beans, cauliflowers, sweet potatoes, eggplants, garlic stalks, cucumbers and sweet peppers. These products have become very popular on the domestic market in northern China, owing to the advantage of a low-temperature climate. Due to lack of cold chain facilities, the consumption of these products is limited in southern China.

9. In order to improve the quality of processed products, new techniques and facilities were introduced into China after the policy of opening to the world was adopted. For example, the automatically controlled tomato and jam producing and packaging lines, concentrated citrus and apple juice producing lines were bought from Sweden, those for asparagus from Spain and Japan, and those for tunnel fluidized freezers from Japan and the United States.

Improvements in the processing technology of the traditional dehydrated, pickled, salted and sugar-preserved products have also been carried out. For instance, a vacuum permeating new technique has been introduced which has shortened the production period of pickled cucumbers from 2 months to approximately 5 days. A decrease in the amount of salt as well as a lighter colour of the vegetables has also taken place to meet nutritional and health requirements. Comprehensive utilization of wild resources which are high in nutritional value has also been developed and increased.

## II. PROSPECTS

10. Agro-industrial research co-operation on adaptable species for raw materials of processing has been conducted since 1965, mainly on citrus fruits, peaches, tomatoes, mushrooms and asparagus. Several cultivars have been selected and identified, and produced commercially in recent years. However, further improvements such as introduction of new varieties for processing, establishment and development of proper management, infrastructure, and processing of new materials are urgently needed to meet the demands of the world market and domestic requirements. Further efforts should be made to improve and resolve problems of firmness, lycopene content of tomatoes; fruit shape, and colour, thickness of flesh, even maturity of yellow peaches; red core of water chestnuts, seed production of asparagus, and rejuvenation and extension of high quality mushroom isolates.

11. Modern efficient energy-saving and low-cost facilities are needed to improve the quality of processing products. For example, facilities for automatic control of tomato pulp density are needed. Various facilities have been imported in recent years, yet the problem of how to make full use of these high-capacity facilities remains. Efforts should be made to establish high-efficient, low-cost and energy-saving facilities on a proper scale.

Consideration should be given to both the development of large-scale state enterprises and small-scale urban enterprises. The former possessing modern facilities and superior technology, are facing inadequate raw material supply and high cost of raw materials, while the latter producing and possessing low-cost raw materials, are short of proper facilities and technologies. Thus low quality products are being produced, which are below standard, even for the domestic market. However, some of the products exported are spoiling the fame of Chinese products. The situation indicates that the establishment of strong and viable agro-industrial complexes might be a solution.

12. Efforts have been made to establish quality control of products, packaging, cans and even model of manufacturing cans. However, further improvements are still urgently needed. In order to prevent waste of capital and quality decline, the quality, nutrition and safety control need to be implemented in advance. Foreign capital (either private investment or joint ventures), modern technologies and facilities are welcomed and encouraged by the Chinese Government. Various laws and regulations have been issued in recent years for those purposes. Regarding the above-mentioned situation, the following items would need special consideration: the introduction of varieties adaptable for processing; establishment, development and management of raw material and infrastructure; the introduction of efficient, energy-saving facilities, packaging materials and technology that would suit the situation in China, for large-, medium- and small-scale enterprises; establishment of agro-industrial complexes; training programmes both for technicians and managers; and co-operation on research projects related to all aspects above.